

# Redfish

MARCH, 2012 (ISSUE #9)



## KEEPING THE **ROYAL GRAMMA**

REEF



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MARINE



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Shrimp for the planted aquarium

Angels and Butterflies

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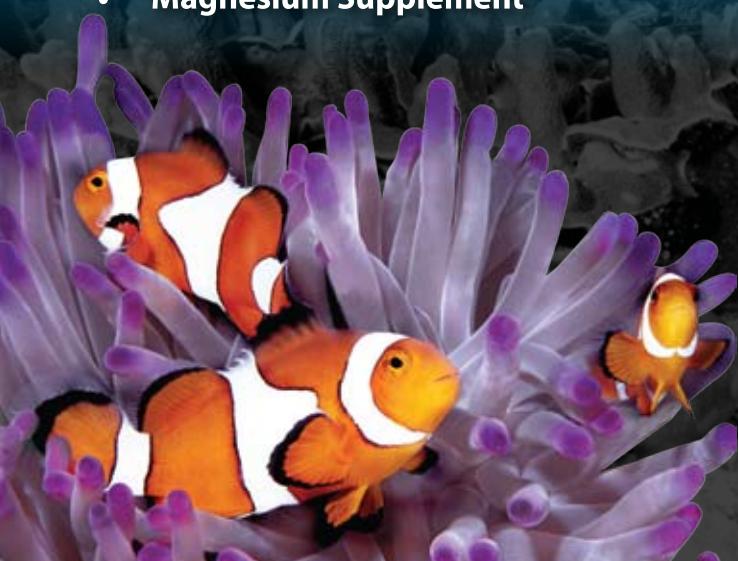


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'Orangespine unicornfish - Naso lituratus' by Brian Gratwicke  
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(Bottom row. Left to Right)  
'Fishes' by Spider.Dog  
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**General Advice Warning**

The advice contained in this publication is general in nature and has been prepared without understanding your personal situation, experience, setup, livestock and/or environmental conditions.

This general advice is not a substitute for, or equivalent of, advice from a professional aquarist, aquarium retailer or veterinarian.

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# About Redfish

Redfish is a free-to-read magazine for fishkeeping enthusiasts.

At Redfish we believe in the free exchange of information to facilitate success by aquarium and pond hobbyists. Each month Redfish Magazine will bring you dedicated sections on tropical, coldwater, marine and ponds.

Redfish was founded in early 2011 by Jessica Drake, Nicole Sawyer, Julian Corlet and David Midgley.

We hope you enjoy this, the ninth issue of Redfish.

古池や蛙飛込む水の音  
ふるいけやかわづとびこむみずのおと

## Aqua One AquaReef

The Aqua One AquaReef is a sophisticated marine system that has been rigorously designed and tested to ensure that your marine setup will run efficiently and provide you with exceptional water quality!

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Aqua One Discus Spawning Cone makes the delicate art form of breeding Discus and Angel Fish simple!

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# OFF THE SHELF

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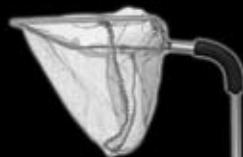
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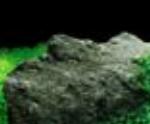
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BY MEGHAN HELMER

# FRESHWATER SHRIMP

*"From the withered tree, a flower blooms"*

Anon.

While fish will most likely maintain their place as the prime attraction in freshwater aquariums, hobbyists have begun to branch out in search of other interesting creatures which they can house in their aquariums. Freshwater shrimp are one such choice, and have a variety of good attributes which make them an excellent addition. First of all, they are small enough to fit into a nano tank or pico tank, which makes them a very good alternative fauna option other than fish where the tanks setup area is limited. The second point advocating these fascinating little crustaceans is that many of the species of shrimp are easily bred in captivity, and are quite prolific once introduced. Finally, their engaging behaviour can make them a joy to observe and a welcome addition to a hobbyist's aquarium.

Like most invertebrates, shrimp must molt their exoskeleton routinely throughout their lives and will require some trace minerals in the water in order to maintain their shells and keep them healthy. Once a shrimp sheds it will eat this cast off shell in order to regain lost nutrients. Due to



Fragile and translucent, freshwater shrimps not only add movement to the planted aquarium but assist the aquarist in their war against algae on leaves.



Shrimp are growing in popularity with planted aquarium enthusiasts.  
Photo by Budi Lukman

this, any shed shells should be left in the aquarium for the shrimp to consume.

The majority of freshwater shrimp are susceptible to being preyed upon by predatory fish, so make sure to use caution when selecting tank mates. Community fish will tend to make the best tank-mates for your shrimp.

It is also wise to be cautious when adding any medication to tanks containing shrimp. Copper based medications in particular are purportedly toxic to invertebrates. Be sure to confirm with the manufacturer if products will be harmful to any shrimp in your tank.

## CHERRY SHRIMP

### *NEOCARIDINA HETEROPODA*

These are a favourite of hobbyists due to their often bright red colour. A native species originating from Southern Asia, Cherry Shrimp are one of the easier shrimp breeds to care for. They provide a nice colour contrast in a planted tank, almost giving off the appearance of tiny flowers from far away. Adding java moss to the aquarium can provide a safe place for these shrimp to live and breed. Care must be taken when cleaning a tank as these small shrimp can easily be sucked up by gravel siphons and filter intake tubes. If possible a sponge filter is recommended for filtration to avoid this issue. These shrimp are omnivorous and do well with a diet consisting of a combination of vegetable matter and small pellet fish foods.

While these shrimp will scavenge algae and other food matter in the tank they are best supplemented by algae tablets and pellet fish foods to keep food sources plentiful and promote breeding. Tank temperature should be within standard tropical tank parameters (23 – 25°C). Cherry Shrimp are not very finicky about pH levels as long as they are stable. They are gentle and peaceful shrimp which will do well in any community tank, but due to their small size, should be mixed carefully with other



Cherry Shrimp are small, peaceful animals. Care needs to be taken to avoid predatory fishes. Photo by Budi Lukman.



tank-mates to prevent predation. Adult Cherry Shrimp can grow to about 3 cm in length, making them one of the best candidates for nano and pico sized aquariums.

These shrimp are incredibly easy to breed in captivity, and will have approximately 20 babies per clutch. Identifying gender is not difficult since females are larger and darker in colour than the males. The female also has a “saddle” patch on their back which can be white or yellow in colour. When a female has spawned, the eggs are easily visible underneath her body, and take about a month to hatch. With the amount of eggs in a clutch and the rapid rate of egg maturation, it is easy to see how quickly a large colony of Cherry Shrimp can be cultivated. The average lifespan of Cherry Shrimp is approximately 2 years.

## RED CRYSTAL SHRIMP *CARIDINA CANTONENSIS*

Red Crystal Shrimp are similar in size and temperament to the Cherry Shrimp. The body is an attractively coloured red with dispersed white patches. They prefer soft and acidic water with a temperature of 18 – 22°C. Water quality is important with these shrimp, as they are sensitive to waste by-products. The Red Crystal Shrimp has been selectively bred to create a wide range of varieties, such as Bee Shrimp and Black and Blue Tiger Shrimp with many of these varieties being highly sought after. Bee Shrimp are known to have black striped colouring instead of the red colours found on the shells of the regular Red Crystal Shrimp. The Blue Tiger Shrimp by contrast have a blue shell, often with black stripes, with white or yellow eyes. As you can see this breed can vary quite significantly in appearance. Diet is similar to other shrimp, and they will readily ingest algae and freshwater pellets.

The cost for these shrimp can greatly vary and they are often categorized and labelled by a “grade” representing the quality of their colouring and the patterns found decorating the shell.



Red Crystal Shrimp are less tolerant of poor water quality than their cherry cousins! Photo by Budi Lukman.



Photo of Icy Maple by Liz West

## AMANO SHRIMP *CARIDINA JAPONICA*

The common name of this shrimp is a reference to aquatic plant guru Takashi Amano who supposedly popularized them in the aquarium setting. They are almost transparent with a slight tan colour. Amano Shrimp originate from Japan, as indicated by the scientific name. The temperament of these shrimp is peaceful, and they will easily get along with other fauna in a tank.

Amano Shrimp can tolerate a wide variety of temperatures, and can even be kept in ponds based in warmer climates. They can eat a variety of algae present in the freshwater aquarium, which has made them a popular addition in the hobby. Unfortunately, they are supposedly difficult to breed in captivity, and so it is likely that many of the specimens are wild caught.

Due to the wild caught nature of many of these shrimp, there is a chance that the stress of being moved from environment to environment may have a detrimental effect on their health. It is not uncommon for Amano Shrimp to perish shortly after introduction into a new tank. Be aware of this potential risk when choosing this shrimp.

The maximum length of the Amano Shrimp is approximately 5 cm; with an average lifespan of 2 to 3 years.

## SULAWESI SHRIMP

Recently there have been a number of new freshwater shrimp discovered in Sulawesi, Indonesia which is collectively referred to as the Sulawesi Shrimp. Many of them were found in one small lake region. Generally they are non aggressive, prefer warmer water temperatures (26-28°C), and slightly alkaline water. The majority seem to belong to genus *Caridina*.

The shrimp from this region display a vast array of colours and patterns. These shrimp are recommended for a more advanced aquarist who has had some previous experience in keeping shrimp. Due to their newness in the aquarium



The Amano Shrimp was popularised by Takashi Amano.



hobby they are often difficult to find and can be prone to dying if proper environmental conditions are not met. As these are fairly new shrimp in the hobby scene, there is little additional information on these charming little crustaceans. More information should become available on these species as they gain popularity in the hobby.

## BAMBOO SHRIMP *ATYOPSIS MOLUCCENSIS*

This is one of the larger freshwater shrimp available to aquarists, growing to a maximum length of 7 cm. Due to their size they would be better if housed in a ten gallon or larger aquarium. They are also known under common names such as the Singapore Shrimp and Flower Shrimp. They are peaceful and shy in temperament, often scuttling behind logs or rocks if approached. Bamboo Shrimp are filter feeders and their front appendages have adapted to this by developing tiny net-like tips in place of pincers. They comb the water, sweeping netted foods into their mouth. This behaviour can be fascinating to watch, and makes them a frequent favourite among hobbyists. It is possible that they may find enough to eat in a large established tank with varied flora and fauna to provide nutrition. In smaller environs, or sparser tanks, feeding may be supplemented with phytoplankton, daphnia, or other similarly sized foods. These shrimp like to stay near the high current areas in a tank, such as the filter outtake or air stone. These invertebrates are difficult to breed in captivity as the young shrimp require semi brackish water to survive. One of the interesting behaviours that the bamboo shrimp display is the ability to change the colour of its shell from bright red to orange-brown. Their body has a lined appearance which in some ways resembles a wood grain pattern, and they have a thick white line laterally down the body.

The bamboo shrimp requires something to anchor itself to and would do well in a planted aquarium. They love to scale tall plants to get close to a favourable current in order to filter



Numerous *Atyopsis* species are traded, this is *Atyopsis gabonensis*, which like the Bamboo Shrimp is a filter feeder.



for food. If it is scavenging on the bottom of the aquarium, it is a sign that the shrimp may not be able to find enough food. The lifespan for these shrimp is on average 2 to 3 years.

## CHAMELEON SHRIMP *MACROBRACHIUM PILIMANUS*

The Chameleon Shrimp is a larger, slightly more aggressive freshwater shrimp. Adult Chameleon Shrimp can reach approximately 5 cm in length. This larger breed of shrimp originates from South East Asia, and is often found in fresh or brackish water across the region. The common name refers to the ability to change their shell's colour depending on mood and colour of the surrounding environment. A handy defense mechanism! The Chameleon Shrimp should be added cautiously to community tanks as they are likely to prey on smaller fish or other crustaceans. The males exhibit larger front arms than the females do. The front arms are the primary manner of which to identify gender in this species. Like most shrimp they are omnivorous and opportunistic; eating a wide range of frozen and pellet foods. Breeding in captivity is difficult, but can be accomplished with care and under the correct tank parameters. Temperature and pH levels do not seem to be a major factor in the Chameleon Shrimp's ability to thrive in a tank.



The strikingly patterned Chameleon Shrimp.  
Photo by Budi Lukman

## GLASS SHRIMP *PALAEMONETES PALUDOSUS*

Glass Shrimp can also go by the common name "Ghost Shrimp". Similar in appearance to the Amano Shrimp, these shrimp reach about 6 cm in length on average. Glass Shrimp originate from North America, and are still harvested in the wild frequently. Quarantine procedures should definitely be put in place before the introduction of new specimens into the aquarium.

It is possible to find these shrimp sold as "feeder" food for other aquatic creatures, and therefore are typically fairly inexpensive to purchase. The lifespan is on average 1 to 2 years for these large shrimp. They are able to survive well in a range of temperatures and pH levels. Like the majority of fresh-



water shrimp, Glass Shrimp are omnivorous and will eat an assortment of food. Although they are sometimes sold as algae eaters, they are not the most efficient of the freshwater shrimp at removing unwanted algae from aquariums, preferring a varied diet over a purely vegetarian one.

## CLOSING REMARKS

This is just a selection of some of the most common freshwater shrimp that are available in the aquarium hobby, but there a number of different species out there and new species are being discovered all the time. Shrimp are a joy to watch in the tank as they tend to move in a manner that is different to other aquatic creatures. Hobbyists looking to add a little colour with very little effort should consider shrimp in a plant tank as they will often offset the plant colourations excellently. Likewise, even rock based terrain will do well to have these small crustaceans roaming around providing something fun to observe and care for.

So if you are considering adding more life to your tank, shrimp can fit a niche that is easy to make room for, and straightforward to set up. 

## ABOUT THE AUTHOR

### Meghan Helmer

Meghan Helmer has always had a passion for nature and fish keeping. Growing up around the lush green forests of British Columbia she developed an appreciation for the beauty and calmness that comes from being outdoors. Although she has always owned aquariums, she has recently been able to find an outlet for both of her passions in the art of aquascaping. She also currently manages the fish section of a local pet store.



The body of the North American Glass Shrimp is, as its name suggests, transparent.

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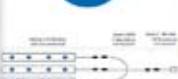
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8223	8 x 12000k white/ 4 x 445nm Royal Blue
8224	12 x 445nm Royal Blue
8226	8 x 445nm Royal Blue/ 4 x Magenta
8227	12 x RGB (use with 8221 control kit)
5019	Polished Reflector
MP-3494	Panorama Power supply single use
MP-3248	Panorama Power supply multi use up to 3 units
5021	Extension cable
5024	3 - Way splitter
8221	RGB Control kit for use with 8227 LED

CODE	NUMBER LEDs - COLOUR
8010	24 x 453nm Actinic Blue
8012	24 x 8000k white
8011	18 x 8000k white/ 6 x 453nm Actinic Blue
8013	24 x 403nm Ultraviolet
8018	16 x 453nm Actinic Blue/ 8 x Magenta
5020	Reflector Stunner LED strips
5021	Extension cable 36"
MP3494	24V regulated power supply

CODE	DESCRIPTION
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1661	LED strip 12 volt 12000k/453nm blue
1664	Lunar light 1Watt 453nm Blue
1666	Lunar light 1Watt 12000k white
MP-3444	12V DC power supply 1Amp
5024	3 way splitter

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KEEPING THE  
**ROYAL GRAMMA**



# QUICK FACT SHEET

The Royal Gramma is a stunningly vibrant marine fish and a favourite amongst reef tank hobbyists. A Royal Gramma named "Gurgle" starred along side Nemo in "Finding Nemo", and it's been suggested that Royal Grammas are one of the most popular and recognisable marine fish for the aquarium.

The Royal Gramma has a bright purple to violet coloured anterior, contrasted by its bright yellow/orange posterior. A thin dark stripe runs from its snout through its eyes, and it has a black spot at the front of its dorsal fin.

## IN THE WILD

The Royal Gramma is found in the Western Atlantic, from Bermuda and the Bahamas, through to the waters of Central America, and down to the northern part of South America. This species likes to live under ledges or in caves and can be found at depths ranging from 1-60 metres/3-200'. In these habitats it's frequently spotted upside down, hugging overhanging corals. In these habitats it feeds on ectoparasites of other fishes acting as a cleaner.

## IN THE AQUARIUM

This fish is popular not only because of its stunning looks, but because it is relatively peaceful and hardy. It is therefore often kept by both novice and experienced aquarists alike. Relatively peaceful it should be noted is a comparative term: it's markedly more peaceful than Domino Damselfish or the similar looking Royal Dottyback, however, it can still harass tankmates in aquariums that are small. Royal Grammas are reef safe. In the aquarium the species is typically easy to feed and will take a variety of prepared foods. The species can be bred in aquariums, and the species does practice some egg guarding. If you can obtain a mated pair of Royal Grammas (no easy task) then getting spawning should be relatively straightforward. The male likes tight caves and crevices to spawn in and typically decorates/hides the cave using macroalgae. Small eggs-balls are guarded initially, though fry can be challenging to feed and raise. 



Photo by Brian Gratwicke

The Royal Dottyback (top) is very similar to the Royal Gramma (below).

Physically the two fish are straightforward to distinguish, the Dottybacks yellow anterior ends abruptly in a straight line, while the Gramma fades to yellow. Another obvious difference is the black spot in the dorsal fin of the Royal Gramma, and the stripe through the eye. In aquariums the species are broadly similar, though one behavioural difference was once described to me by a friend:

"*the Royal Gramma can harass tankmates*" he said  
"*What about the Royal Dottyback?*" I asked  
"*those kill their tankmates*" came the reply.

Unsurprisingly, mixing the two species is a poor idea and will result in fatalities in all but the largest aquarium.



photo by Khantipol

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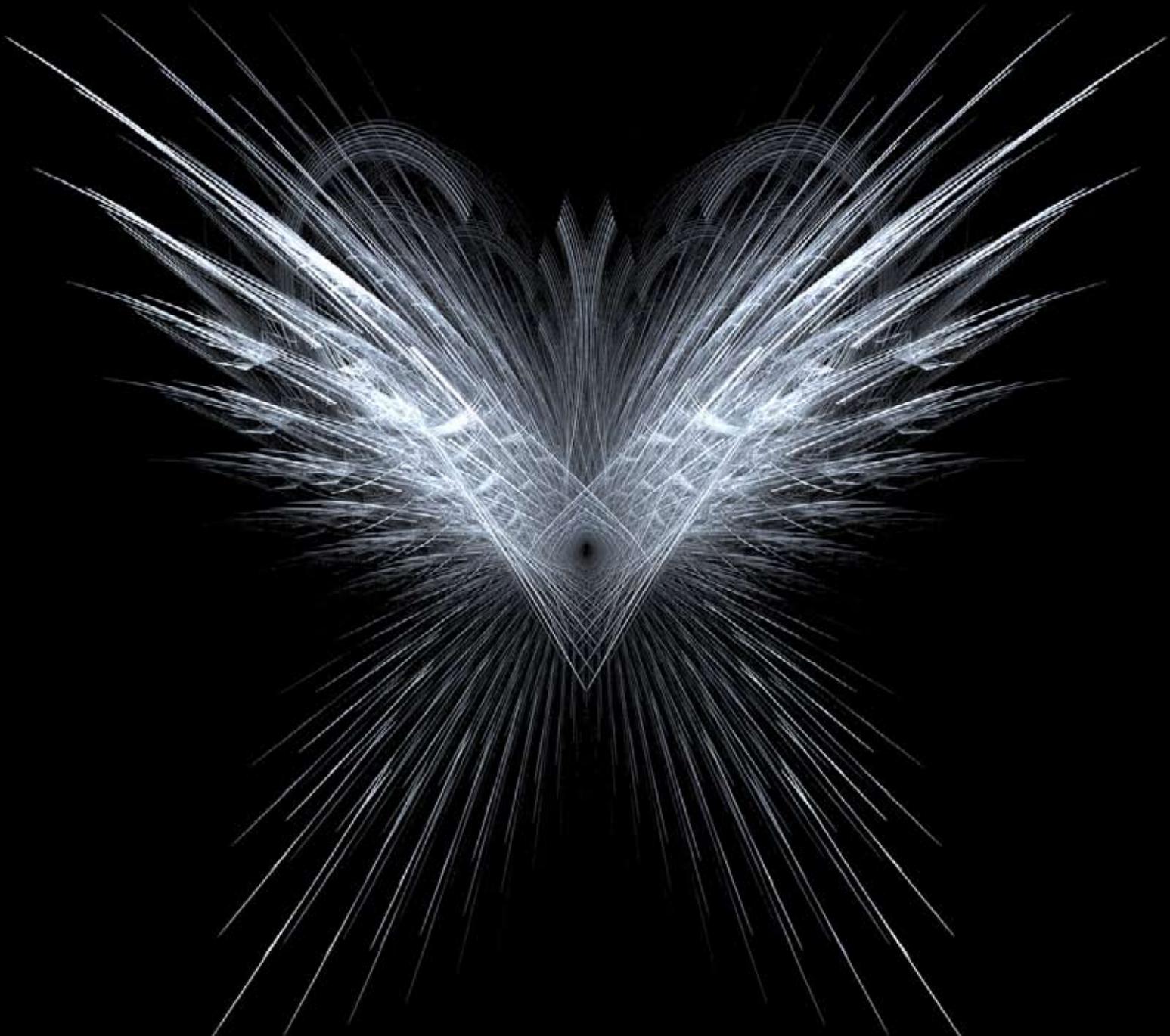
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# ANGELS and butterflies

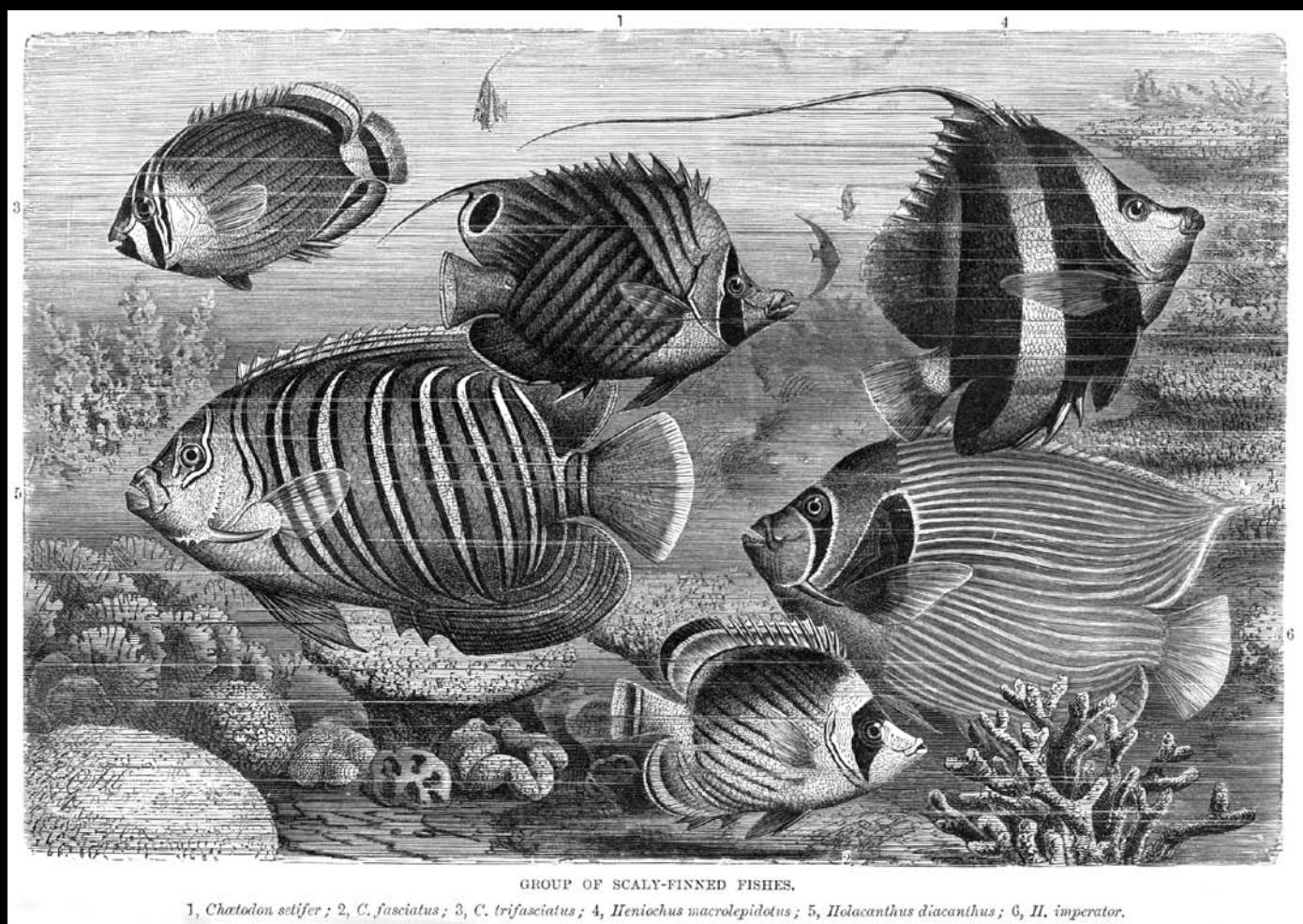
by Aaron Sewell



Prior to 1974, angelfishes and butterflyfishes were sub-families (Pomacanthinae and Chaetodontinae, respectively) of the family Chaetodontidae. Dr. Warren Burgess, renowned ichyologist and also an aquarist completed a study that indicated that the elevation of angelfishes to their own family was warranted. This suggestion was validated by other studies giving us the two separate families we have today, Pomacanthidae (angelfishes) and Chaetodontidae (butterflyfishes).

What this means is that while there are distinct differences between the 2 groups of fish, there are also many similarities. The name Chaetodont is derived from the Greek words 'chaet' (or khait) meaning hair and 'dontis' meaning tooth. This pertains to the brush-like teeth found in all chaetodonts and pomacanthids used by many species for removing prey such as coral polyps or polychaetes from their homes (corallites, tubes, rocks, etc). Fish from both familes have deep, laterally flattened bodies with no discontinuation between the first and second dorsal fins.

The most obvious differences between an angelfish and a butterflyfish is the presence of a long spine at the base of the preoperculum in the former as well as a generally longer, pointier rostrum



This print from 1893 shows the family Chaetodontidae with the angelfishes included.



this beautiful Queen Angelish (*Holacanthus ciliaris*) illustrates the spine at the base of the preoperculum.  
Photo by Brian Gratwicke

(mouth or beak) in the latter. While there are other less notable differences, this is of most importance for aquarists. The other notable difference, though not from any scientific or technical perspective, is that angelfish in general are more suited to life in an aquarium, though there are notable exceptions on both sides. Similarities include diet which generally consists of benthic invertebrates, though again, there are exceptions, with members of most families being largely carnivorous (though some angelfish also include benthic algae in their diet).

## Chaetodontidae

While butterflyfishes tend to be more difficult to keep in an aquarium, there are some that are far more difficult than others. As a general rule, butterflyfish are not exactly reef-safe in that they all feed on benthic invertebrates that are found in the average reef aquarium, however, some are more safe than others. Butterflyfishes fall into three categories, obligate corallivores (those that feed on corals by necessity), facultative corallivores (those that will feed on corals but do not absolutely require them as part of their diet) and non-corallivores (those that do

not feed on corals). The first category is generally not suited to aquarium life because not many aquarists are prepared to provide a constant supply of corals to feed to their fish. Unfortunately, many of the more attractive species fall into this category.

The family is not particularly large with only 11 genera and 114 recognised species but the number of species that make their way into the aquarium trade is relatively high, though the majority of those encountered fall into just 6 genera.

## *Chaetodon*

The *Chaetodon* genus is the type genus of the family and contains the vast majority of species within the family (some genera contain between 1-3 species). There are three main body shapes found in the genus and despite there being several subgenera and clades within the family, body shape does not appear to be an indicative factor of monophyly. The main shapes are oval, triangular and rectangular, with most fish in the family having very geometric shapes.

Many of the commonly encountered obligate



A selection of species from the genus *Chaetodon*.

Top left: Zanzibar butterflyfish (*Chaetodon zanzibarensis*). Top right: Vagabond butterfly fish (*Chaetodon vagabundus*). Centre left: Saddleback Butterflyfish (*Chaetodon ephippium*). Photo by Leonard Low. Centre right: Blackback butterflyfish (*Chaetodon melannotus*) by Leonard Low. Bottom left: Threadfin Butterflyfish (*Chaetodon auriga*). Photo by tab2\_dawa @ flickr. Bottom right: Black-tailed Butterflyfish (*Chaetodon austriacus*) by Boaz Harel.

corallivores belong to the genus *Chaetodon* and include the Ornate Butterflyfish (*Chaetodon ornatissimus*), the Oval Butterflyfish (*C. lunulatus*) and the Blue Dash Butterflyfish (*C. plebius*) which are among the most attractive species within the genus. Species such as the Sunset Butterflyfish (*C. pelewensis*) and the Spotband Butterflyfish (*C. punctatofasciatus*) are commonly offered to aquarists and they fall into the category of facultative corallivores. Because they will eat corals when on offer, it is recommended that they be kept in fish only aquariums where both tend to fare well taking alternative foods such as brine shrimp, mysis shrimp or even dried foods such as flakes or small pellets.

There are no non-corallivores in the family, though some species such as the Blackwedge Butterflyfish (*C. falcula*) may fare well in a reef aquarium with low risk to corals, provided sufficient alternative foods are provided.

## *Chelmon*

Though a small genus with only 3 species, the Copperband Butterflyfish (*Chelmon rostratus*) and the Margined Butterflyfish (*C. marginalis*) are quite common in the trade. Both species are found in shallow (up to 25m) water and reach sizes of around 20cm in length. Their diets comprise of various benthic invertebrates including corals and small anemones and are often acquired by aquarists to help control outbreaks of pest anemones such as *Aiptasia* and *Anemonia*. These fish tend to fare reasonably well in captivity and readily accept various foods including frozen and freeze dried foods as well as flakes and pellets. They are sensitive to water conditions and are probably best suited to



The Copperband Butterflyfish is not a recommended fish for inexperienced aquarists.



Red Sea Bannerfish (*Heniochus intermedius*)

moderately experienced aquarists.

## *Heniochus*

Unlike other members of the family, the *Heniochus* are shoaling fish and are found in small (or occasionally large) groups on the reef. Often referred to as bannerfish due to the elongated first dorsal spine in most species, these fish are fairly consistent in their colouring. While the patterns vary, all members of the family are coloured with a combination of black, white and gold, which can vary from bright yellow to a dull, almost bronze colour. Unlike other butterflyfishes, the *Heniochus* are largely planktivorous fish though they will also eat benthic invertebrates. Most species are fish cleaners as juveniles, i.e. they will feed on the parasites being carried by other fish and they will congregate at cleaning stations with cleaner wrasses, cleaner shrimp and other juvenile fish. Due to their varied diet that consists largely of zooplankton, these fish are far more suited to captivity than many of their relatives. Bannerfish will eagerly accept a wide range of foods and are also more toler-



Schooling Bannerfish (*Heniochus diphreutes*)



Bannerfish (top) are very similar to these Moorish Idols (*Zanclus cornutus*) though they are not related.

ant of changes in water quality than most other butterflyfishes. Although they require larger aquariums than many other chaetodonts, bannerfish are the best choice of butterflyfish for beginner to intermediate aquarists.

## *Forcipiger*

There are just two species in the genus *Forcipiger* but due to the extreme similarity, they are not easy to distinguish. The Yellow Longnose Butterflyfish (*Forcipiger flavissimus*) and the Very Longnose Butterflyfish (*F. longirostris*) both have a yellow body with a head that is black from the eyes up and white below. They also share a particularly long rostris (not surprisingly the difference is the length which is greater in the latter) that is used for removing prey from deep, narrow holes in the reef. Unlike other butterflyfish that have a long rostris, these fish do not feed on coral polyps but rather feed on small crustaceans and worms (mainly sedentary polychaetes such as christmas tree worms or fan worms). In fact the name *Forcipiger* is derived from the fact the rostris of these fish looks and

### ABOUT THE AUTHOR

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In 2004 Aaron completed a BSc (Marine Science) at the University of Sydney with majors in marine biology and tropical marine science. Since 2001 he has been involved with the aquarium industry at hobbyist and retail level and now works in aquarium product development. Aaron is a former committee member of the Marine Aquarium Society of Sydney and has collected fish and corals in Fiji for the US and European aquarium industries. Aaron has been writing for several local and international aquarium magazines since 2004.



a young Yellow Longnose Butterflyfish.



a Cherub Angelfish (*Centropyge argi*). Photo by Brian Gratwicke.

functions like a pair of forceps.

## Pomacanthidae

Some of the most attractive and desirable species of aquarium fish belong to the family Pomacanthidae. It comes as little wonder that members of this family are given the names king, queen and emperor, with stunning colouration and shapes that make these fish not only alluring to aquarists but also widely used in signage and marketing for so many companies with links to the reef, and even many who have none.

Like butterflyfishes, angelfishes in general pose some risk to corals and other sessile invertebrates in the aquarium, but they also contain a genus of planktivorous fish that offer something for those who want to take no risks with their prized coral collection. Pomacanthids in general have a far more varied diet than chaetodonts and this diet has resulted in a less prominent rostris.

There is conjecture over the number of genera in

the family but the acceptable number is probably eight. However, work is currently being undertaken to reclassify the family which could result in more or less genera and will almost certainly see some species moved. Of particular note are the *Holacanthus* which appears to be a paraphyletic genus that contains species that simply do not belong to any of the other designated genera. All eight genera are represented with some regularity in the aquarium trade and if you look hard enough, it is almost certainly possible to find any species you desire. Whether you're prepared to part with the cash required to obtain the species you desire may be another matter entirely. Angelfishes are found throughout the tropical seas of the world and due to their allure, they are collected from almost every region they are found.

### *Centropyge*

It makes sense to start with the most commonly encountered genus in the family, the dwarf or pygmy angelfishes. Coral Beauties (*Centropyge bispinosus*), Flame Angels (*C. loriculus*), Bicolour Angels (*C. bicolor*), Potter's Angels (*C. potteri*)

and countless other dwarf angels can be found in most marine aquarium stores with amazing regularity. These fish are so desirable to aquarists because they are small (most reach only around 10-15cm in length), colourful and highly active fish. They are also fairly resilient fish with few exceptions. Aquarists that buy on impulse have usually added one or more of these fish to their aquarium at some point in time. However, many (though certainly not all) aquarists find that by doing so they have made a mistake. In a coral reef aquarium, these fish may be model citizens or they may be painfully destructive. Being facultative corallivores, there is always a risk that a dwarf angel will make short work of corals, particularly large polyped fleshy corals such as *Acanthastrea* or *Trachyphyllia*. While making suggestions as to which species pose less risk than others is fraught with danger, Flame Angels do appear anecdotally to have a greater success rate with aquarists looking for a reef-safe dwarf angel (though one would have to question if there is such a thing).

It should be noted that three species often regarded as *Centropyge* spp. are probably more rightfully members of a new genus, *Paracentropyge*, though they still certainly fit the description of a dwarf angel. The Purple Mask Angel (*Paracentropyge venusta*), the Multi-barred Angel (*P. multifasciatus*) and the Peppermint Angel (*P. boylei*) have been shuffled between genera (*Centropyge*, *Paracentropyge* and even *Sumeriyakko* in the case of the Venusta Angel) over time but now appear to be settled in their own genus.

## *Pomacanthus*

The genus *Pomacanthus* is the type genus of the family and contains some species that would be very familiar to aquarists including the Emperor Angel (*Pomacanthus imperatus*), Blueface Angel (*P. Euxiphipops xanthometopon*) and the Asfur Angel (*P. Arusetta asfur*). Note the subgenera names in the species listed. The subgenus *Euxiphipops* contains 3 species while the subgenus *Arusetta* contains 2; these subgenera have in the past moved back and forth between genus



the Flame Angel (*Centropyge loriculus*)  
Photo by Andreas März



the Dusky Angelfish (*Centropyge multispinis*)  
Photo by Brian Gratwicke



Japanese pygmy angelfish (*Centropyge interruptus*)  
Photo by Juuyoh TANAKA



the Bicolor Angel (*Centropyge bicolor*)

The iconic Emperor Angelfish (*Pomacanthus imperatus*)





A selection of species from the genus *Pomacanthus*.

Top left: Yellowbar Angelfish (*Pomacanthus maculosus*). Top right: the juvenile form of the Koran or Semicircle Angelfish (*Pomacanthus semicirculatus*). Photo by Karelj. Centre left: Blueface Angelfish (*Pomacanthus xanthometopon*). Centre right: French Angelfish (*Pomocanthus paru*). Photo by Brian Gratwicke. Bottom left: Cortez Angelfish (*Pomacanthus zonipectus*). Photo by Laszlo Ilyes. Bottom right: Majestic Angelfish (*Pomacanthus navarchus*). Photo by Rene Lutz.



the Regal Angelfish (*Pygoplites diacanthus*) should probably be left to experts.

Photo by National Marine Sanctuaries

and subgenus level and it is likely that they will once again find themselves elevated to genus level in the latest revision of the family. Like their dwarf relatives, these fish are notoriously unsafe with corals and giant clams and given their much greater size, which for most species reaches around 40-45cm, they can prove devastating in a coral dominated aquarium. Anecdotal evidence suggests that acquiring these fish as juveniles reduces the risk but the risk can never be eliminated. One attribute shared by all species in the family is a distinct colour difference between juveniles and adults. Juvenile colouration is a combination of black, white and blue, with some species having the white replaced by yellow. Adult colouration is far less uniform though the same colours tend to be represented strongly. *Pomacanthus* angels tend to fare well in captivity when kept by aquarists with reasonable amounts of experience, though given their size, they absolutely require large aquariums.

## *Pygoplites*

The monotypic Regal Angel (*Pygoplites diacanthus*) is the sole member of this genus and is common in the trade despite its less than impressive captive record. These fish fare poorly in captivity due almost entirely to their unwillingness to feed in captive conditions. It appears that in many cases it is not through lack of suitable foods but simply a case of the fish being unhappy in its new environment. Still, because of their alluring colouration, these fish continue to be collected in large numbers and fortunately some aquarists have success keeping them.

Regals angels reach around 30cm in length and are found in two fairly distinct colour morphs. Those collected in and around the Red Sea have more blue and a darker shade of blue than those found in the Pacific and Eastern Indian Oceans. Anecdotally, the Red Sea variants fare better in captivity as they are more willing to accept prepared foods. Like the *Pomacanthus* angels, these fish have a distinct juvenile colouration which



the King Angelfish (*Holacanthus passer*) is a truly magnificent animal.

Photo by Laszlo Ilyes.



the Rock Beauty (*Holacanthus tricolor*)

Photo by Laszlo Ilyes.



the Queen Angel is a much sought after species, however, its large size dictates a suitable housing.

is predominantly yellow with small amounts of orange and blue. Regal Angelfish are not as boisterous and aggressive as some of the other larger angelfish and given their finicky eating behaviour, it is generally recommended they be kept with small, more peaceful fish and should not be kept with other large angels unless the tank is suitably large.

## *Holacanthus*

The *Holacanthus* genus appears to be nothing more than a spare parts genus that homes all the species that do not fit into any of the other genera. In general, the species in this genus are large (though the Rock Beauty (*Holacanthus tricolor*) reaches only around 25cm) and in many ways is not dissimilar to those of the genus *Pomacanthus*. While the *Pomacanthus* are restricted to the Western Pacific and Indian Oceans, *Holacanthus* are found in the Eastern Pacific and Atlantic Oceans so there are no species represented in Australian waters. This means fish in this genus, which include some of the most alluring species such as the King Angel

just means "hard to get." They are probably not more than an ecological perspective. They are native to Hawaii and usually live in waters too deep for most divers to venture. The fish is so uncommon in the aquarium community that every known instance of one of these fishes coming into an aquarium store usually makes the "news." This past May, a popular American aquarium blog reported on one *Pomacanthus arcuatus* brought in to an aquarium store in Connecticut. This was a big deal for American aquarists because most highly prized ornamental fish go to Japan, the Mecca of ornamental aquatics. In 2009, a pair of masked angelfish went on sale in Japan for a steep \$30,000 U.S.

*Pomacanthus arcuatus* are gorgeous white fish trimmed with color. Males and females are easily distinguishable from each other. At the Waikiki Aquarium in Hawaii, aquarist Karen Britain managed to breed the fish in captivity. Unfortunately only produced one viable juvenile which later died after jumping out of the water. The fact that even just one fish could be produced from captive breeding is a good sign that the fish could be bred in greater quantities at some point in the future.

#### Conclusions

The name "masked angelfish" is one of many examples when a common name causes confusion. Despite sharing the common name, the three fish have little else in common. One is a large angelfish which is difficult but not impossible to keep, found in relatively shallow reef water in the Indo-Pacific. One is a small angelfish found in caves in the Northern Pacific that is very difficult, if not impossible, to keep and rarely available for sale. The third is a Hawaiian angelfish so unknown in the aquarium community that you could probably count all of the specimens currently being kept in captivity on just two hands. Regardless, these are beautiful species, all of which are best suited to marine hobbyists with plenty of experience under their belt! ■



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Masked angels, including *Genicanthus* species are covered in Sara Allyn Mavinkurve's article in Redfish Issue #2.

(*H. passer*), the Queen Angel (*H. ciliaris*) and the Clarion Angel (*H. clarionensis*), command very high asking prices in the Australian trade. Like other large angelfish, the *Holacanthus* are renowned coral eaters and pose a significant risk to corals, giant clams and many other sedentary invertebrates.

## Genicanthus

The Swallowtail Angelfish of the genus *Genicanthus* are unlike other pomacanthids in many ways. Their appearance is extremely different to other members of the family, they generally lack the vibrant colours possessed by other angelfish but most importantly they are 100% safe to keep with corals, giant clams and any other sedentary invertebrates. All eight members of the genus are planktivores and in the aquarium will readily accept brine shrimp and mysis shrimp as well as usually taking flake and pellet foods with little coaxing. Swallowtail Angels are not particularly territorial in that while they will remain in a small region of the reef, they are quite tolerant of con-

specifics, even males will not drive other males away from their territory.

For more detailed information on the masked angelfishes (*Genicanthus personatus*, *Paracanthurus venusta* and *Pomacanthus xanthomelas*), refer to Sara Allyn Mavinkurve's article in Redfish Issue 2 (August 2011).

## Conclusions

While the general rule suggests angelfishes and butterflyfishes are not ideal candidates for reef aquaria, the fact is most of these fish are kept in coral aquaria rather than fish only aquaria. This is due to a combination of species selection, aquarists finding a suitable individual or the beauty of the fish that means some aquarists are prepared to sacrifice some of their corals in order to keep these often spectacular fish. Blanket rules do not apply to these fish with ranges from aggressive to passive, small to large, easy to keep to near impossible so as with any fish, research of individual species is absolutely essential. ■



Three-spot Angelfish (*Apolemichthys trimaculatus*) are from an unusual genus, but are broadly similar to the other fishes in this group.



# ENTER THE DRAGONET

Immensely popular, stunningly coloured and fascinating to watch dragonets such as this Mandarinfish are a favourite with hobbyists.

Dragonets are, however, not straightforward to keep in the reef aquarium and many needlessly die through a lack of understanding by aquarists. Impulse buyers should steer well clear of these little fishes but they can be kept if one knows how!

## BIOLOGY, BIOGEOGRAPHY, ECOLOGY AND TAXONOMY

The family Callionymidae includes around 130 species in 18 genera. Most species are marine and occur in the Indo-Pacific in tropical regions. There are, however, some brackish and freshwater species. Almost all callionymids are small-sized bottom dwellers. The largest species reach around 30cm (1') while the smallest attain only 2cm (3/4"). Many species are sexually dimorphic and are patterned, interestingly camouflaged or coloured.

A relatively small portion of the 130 species are popular in the aquarium trade. While most of those species popular in the hobby are reef-dwellers, most wild species live on sandy bottomed zones. Almost all species feed on small live invertebrates. The family as a whole does not practice advanced forms of brood care.

## AN UNCOMMONLY AVAILABLE SPECIES

Before we launch into a discussion of their care and their keeping and the commonly traded species I thought it would be fun to have a look at one of the more unusual species in this group:

### Fingered Dragonet (*Dactylopus dactylopus*)

The Fingered Dragonet occurs in the Indo-Pacific, ranging from Japan to northern Australia. It's one of the larger species in the family and will grow to over 6" in length. Remarkably camouflaged individuals (or pairs) are often seen in areas with sandy/weed bottoms where they hunt benthic invertebrates using a protruable downward-pointing jaw. Males can be distinguished by a more elaborate dorsal fin. Pairs spawn in the water column and don't guard their eggs.



a Fingered Dragonet rests on the bottom near Lembeh, Indonesia. Photographed by Silke Baron.

## COMMONLY TRADED SPECIES

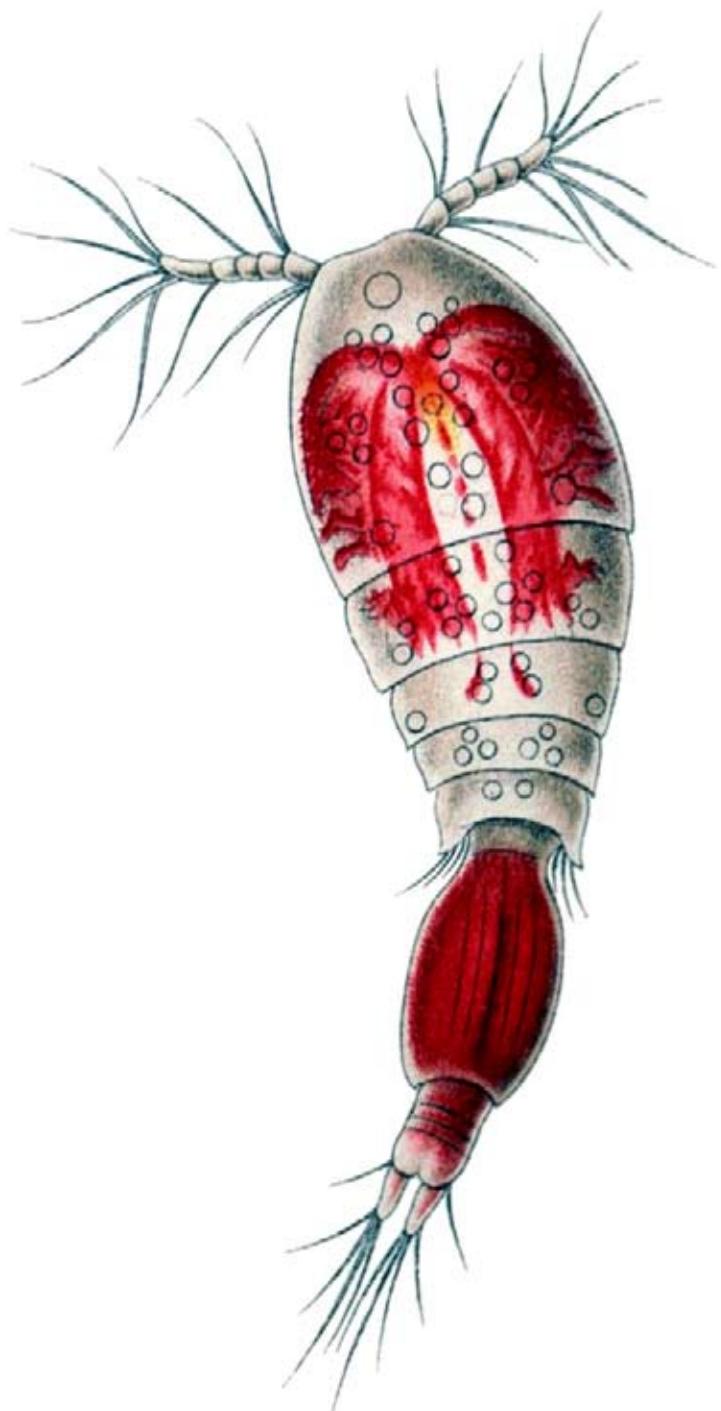
Although other species are sometimes available, the trade is heavily weighted in favour of three species: the Mandarin Goby (*Synchiropus splendidus*), the Spotted (or Pictur-esque) Dragonet (*Synchiropus picturatus*) and the Scooter Blenny/Dragonet (*Synchiropus ocellatus*).

## SHARED PROBLEMS WITH FEEDING

Let's be clear at the outset, these fish can be difficult to keep successfully. Unless you are setting out specifically to maintain one of these three species: the best advice is not to purchase these fish. If you're determined to keep this species it is not so much that it's hard - it's that you need to be committed to the task required.

### So what is required?

1. All Dragonets are slow and somewhat ponderous feeders, this dictates that in the majority of aquariums they should be kept in the absence of fast-swimming, active feeding species. They are reef safe, however, large anemones and crustaceans should be avoided as they may eat dragonets.
2. The diet of most species consists almost entirely of copepods and amphipods. If you don't have copepods and amphipods your dragonets will likely spend months slowly starving to death. This dictates that copepods and amphipods are required, and to facilitate this you either need to obtain live copepods or amphipods regularly or breed them in your aquarium. The latter is the best solution and is best facilitated by furnishing the largest possible aquarium with large amounts of live rock and connecting your main tank to the the largest possible refugium. Despite their small size they aren't suitable for nano aquariums.



Breeding of copepods (the example above, *Oncaea venusta*, grows to 1.3mm) is vital for successful keeping of virtually all dragonet species. While mysis or brine shrimp may be accepted by some individuals, others may not take this food.



The Scooter Blenny (*Synchiropus ocellatus*) is probably the most likely of the three dragonets to take mysis or brine shrimp, however, some individuals refuse so copepods are still required. Photo by Budi Lukman.

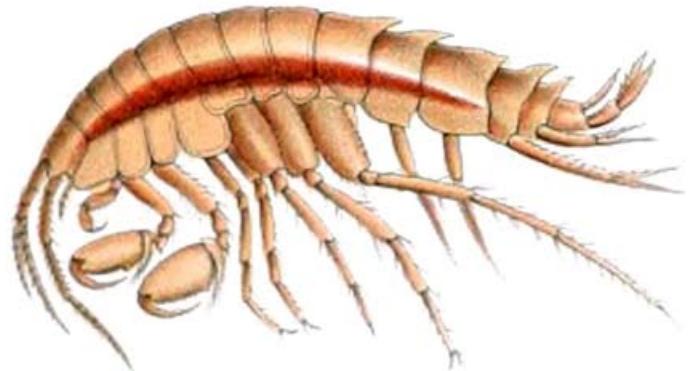


The Spotted (aka Psychedlic) Mandarinfish (*Synchiropus picturatus*) should be cared for much like the regular mandarin fish. Feeding as with all these fishes is challenging in regular reef systems.

## CONCLUSIONS & CLOSING REMARKS

Far too many dragonets die in the aquarium trade. Almost all of this is down to the peculiarities of their feeding and impulse purchases by newcomers to reefkeeping. Much of the advice on the internet suggests one should seek out actively feeding individuals, and while this is true - if you don't have the required setup you should leave these little beauties in the ocean. Indeed, dragonets should be viewed by aquarists in much the same way as seahorses and pipefish - they are specialist fish that don't suit the beginner who is unarmed with the knowledge appropriate for their care.

If you're establishing a reef-tank that has a very vibrant refugium, a low-fish load and a heavy stocking of live rock then you may want to consider dragonets in your planning. ♦♦



Along with copepods, amphipods are readily accepted as prey items by dragonets. While similar looking to copepods, amphipods are part of a distant class and are not closely related to copepods.

Regardless, both groups will readily breed in a well maintained aquarium refugia and this is the best way to supply sufficient food to dragonets.



a pair of Mandarinfish on the reef at Lembeh, Indonesia.  
Photo by Silke Baron

# Community Directory

## INTERNATIONAL

Advanced Aquarist

Salty Tank

American Livebearer Association

USA Fish Box

<http://www.advancedaquarist.com>  
<http://www.saltytank.com>  
<http://livebearers.org/>  
<http://usafishbox.forumotion.com/>

## CANADA

Betta Breeders Canada

### Alberta

Calgary Aquarium Society

Edmonton Aquarium Club

### British Columbia

Vancouver Aquatic Hobbyist Society

Wet Coast Aquarium Society

### Ontario

Brampton Aquarium Club

Peel Aquarium Club

Brant Aquarium Society

Chatham-Kent Aquarium Society

St Catharines & Area Aquarium Soc.

Durham Region Aquarium Society

Ottawa Valley Aquarium Society

Hamilton & District Aquarium Society

Forest City Pond Club

Kitchener/Waterloo Aquarium Society

London Aquarium Society

Sarnia Aquarium Society

Toronto Willowdale Aquarium Society

### Manitoba

Aquarium Society of Winnipeg

### Nova Scotia

East Coast Aquarium Society

### Saskatchewan

Saskatoon Aquarium Society

Regina Aquarium Society

### Quebec

Montreal Aquarium Society

La Societe des Aquariophilie de Montreal

Ass. Reg. des Aquariophiles de Quebec

<http://www.bettabreederscanada.com/>

<http://www.calgaryaquariumsociety.com/>  
<http://www.fish-club.org/>

<http://vahs.ca/>  
<http://wetcoastaquariumsociety.ca/wetcoast/>

<http://www.bac-on.org/>  
<http://www.peelaquariumclub.org/>  
<http://www.brantaquariumsociety.ca/>  
<http://www.cichlidae.com/forum/viewforum.php?f=103>  
<http://www.scaas.info/index.html>  
<http://www.dras.ca/>  
<http://ovas.ca/>  
<http://www3.sympatico.ca/ps.mcfarlane/home.htm>  
<http://www.freewebs.com/fcpc/>  
<http://www.kwas.ca/>  
<http://www.londonaquariassociety.com/>  
<http://www.geocities.com/sarniaaquariumsociety/>  
<http://www.torontoaquarium.org/>

<http://www.asw.ca/>

<http://www.eastcoastaquariumsociety.ca/forum/>

<http://www.saskatoonaquarium.com/>  
<http://www.reginaaquariumsociety.ca/>

<http://www.geocities.com/mltfishclub/index.html>  
<http://www.aquasam.qc.ca/>  
<http://www.oricom.ca/pierdes/>

## UNITED STATES OF AMERICA

### Alaska

Juneau Aquarium Society

### Arizona

Dry Wash Aquarium Society

### California

Bakersfield Koi & Water garden Society

Desert Fish Club

Sacramento Aquarium Society

San Francisco Aquarium Society

Silicon Valley Aquarium Society

Santa Clara Valley Koi and Water Garden Club

San Diego Tropical Fish Society

Pacific Coast Cichlid Association

### Colorado

Southern Colorado Aquarium Society

Colorado Aquarium Society

Rocky Mountain Cichlid Association

### Connecticut

Aqua-Land Aquatic Society

Exotic Fish Society of Hartford Inc.

Norwalk Aquarium Society

### Florida

Gold Coast Aquarium Society South Florida

Tampa Bay Aquarium Society

### Georgia

Atlanta Area Aquarium Society

### Hawaii

Honolulu Aquarium Society

<http://www.taursys.com/kasha/JAS/>

<http://www.drywashaquarium.org/>

<http://www.bakersfieldkoiclub.com/>  
<http://www.desertfishclub.com>  
<http://www.sacramentoaquariumsociety.org/>  
<http://www.sfaquarium.org/>  
<http://www.tactics.com/d/svas/>  
<http://www.sckoi.com/>  
<http://www.geocities.com/sandiegofishfan/>  
<http://www.cichlidworld.com/>

<http://www.southerncoloradoaquariumsociety.com/>  
<http://www.coloradoaquarium.org>  
<http://www.liiss.olm.net/rmca/>

<http://pages.cthome.net/vito/>  
<http://users.rcn.com/wmercer/>  
<http://www.castaways56.supanet.com/>

<http://www.gcassf.org/Home.htm>  
<http://www.tbas1.com/>

<http://atlantaaquarium.com/>

<http://www.geocities.com/Heartland/Meadows/2948/HASF.html>

**Illinois**

Champaign Area Fish Exchange  
Chicagoland Marine Aquarium Society  
Planted Aquarium Club of Chicago  
Tri-County Tropical Fish Society  
Greater Chicago Cichlid Association  
Rockford Reefers Aquarium Club

**Indiana**

Circle City Aquarium Club, Inc.  
Indiana Marine Aquarium Society  
Michiana Aquarium Society

**Iowa**

Eastern Iowa Aquarium Association  
Iowa Aquarium Society  
Greater Iowa Reef Society

**Kentucky**

Greater Louisville Koi & Goldfish Society  
Louisville Marine Aquarium Society

**Maine**

Great Lakes Aquarium Society  
Worcester Aquarium Society

**Massachusetts**

Boston Aquarium Society  
Pioneer Valley Aquarium Society  
Worcester Aquarium Society

**Michigan**

The Aquarium Society of Ann Arbor  
Grand Valley Aquarium Club  
Southwestern Michigan Aquarium Society  
Motor City Aquarium Society  
Greater Detroit Aquarium Society  
Metro Detroit Aquarium Clubs  
Upp. Peninsula of Michigan Marine Aq. Soc.  
Marinelife Aquarium Society of Michigan

**Minnesota**

Minnesota Aquarium Society  
Red River Valley Aquarium Club

**Missouri**

Missouri Aquarium Society  
Heart of America Aquarium Society

**New Hampshire**

New Hampshire Aquarium Society

**New Jersey**

Jersey Shore Aquarium Society  
North Jersey Aquarium Society

**New York**

Greater City Aquarium Society  
Brooklyn Aquarium Society  
Allegheny River Valley Aquarium Society  
Long Island Aquarium Society  
Central New York Aquarium Society  
Nassau County Aquarium Society  
Danbury Area Aquarium Society  
Tropical Fish Club of Erie County

**North Carolina**

Raleigh Aquarium Society  
Cape Fear Aquarium Society

**Ohio**

Stark County Aqua Life Enthusiasts  
Greater Cincinnati Aquarium Society  
Cleveland Aquarium Society  
Ohio Cichlid Association  
Greater Akron Aquarium Society  
Medina County Aquarium Society  
Youngstown Area Tropical Fish Society  
Ashtabula County Aquarium Club  
Lorain County Aquarium Society  
Columbus Area Fish Enthusiasts

**Oklahoma**

Oklahoma Aquarium Association

<http://www.champaignfish.com/>  
<http://www.cmas.net/>  
<http://www.pacchicago.org/>  
<http://aquariumhobbyist.com/tctfs/index.html>  
<http://www.gcca.net>  
<http://www.rockfordreefersaquariumclub.org/>

<http://www.circlecityaqclub.org>  
<http://indmas.org>  
<http://michianaaquariumsociety.org/>

<http://www.eiaainfo.org/>  
<http://www.iowaquaaria.com/>  
<http://www.greateriowareefsociety.org/>

<http://www.louisvillekoiclub.com/>  
<http://www.lmas.org/joomla/>

<http://www.glaquarium.org/>  
<http://www.petsforum.com/was/>

<http://www.bostonaquariumsociety.org/>  
<http://www.pvas.net/html/>  
<http://www.petsforum.com/was/>

<http://sitemaker.umich.edu/aquarium.society>  
<http://www.grandvalleyaquariumclub.org>  
<http://www.swmas.org/>  
<http://home.att.net/%7ec.r.newell/clubs/page2.html>  
<http://www.greaterdetroitaquariumsociety.com/>  
<http://home.att.net/~c.r.newell/clubs/>  
<http://www.upmmas.com/>  
<http://www.mas.m.org/>

<http://www.mn-aquarium.org/>  
<http://www.geocities.com/fmaquarium/>

<http://www.MissouriAquariumSociety.com>  
<http://www.kcfishclub.org/>

<http://www.nhaquariumsociety.com/index.htm>

<http://www.jerseyshoreas.org/>  
<http://www.njas.net/>

<http://ourworld.compuserve.com/homepages/greatercity/>  
<http://www.basny.org/>  
<http://www.orgsites.com/ny/arvas>  
<http://www.liasonline.org>  
<http://www.cnyas.org/>  
<http://www.ncasweb.org>  
<http://northeastcouncil.org/daas/index.html>  
<http://tfcec.tripod.com/tfcecwebsite/>

<http://www.fishclubs.com/nc/ras/main.html>  
<http://capefearaquariumsociety.com/>

<http://www.scalesclub.com/>  
<http://www.gcas.org/>  
<http://www.clevelandaquariumsociety.org>  
<http://www.ohiocichlid.com/>  
<http://www.gaas-fish.net>  
<http://www.geocities.com/MCASfish/>  
<http://www.yatfs.com/>  
<http://www.geocities.com/Heartland/Park/6982/index.html>  
<http://geocities.com/RainForest/Andes/3049/>  
<http://www.columbusfishclub.org/>

<http://petsforum.com/okcaa/>

### Oregon

Greater Portland Aquarium Society

### Pennsylvania

Bucks County Aquarium Society

### Pennsylvania (cont)

Delaware County Aquarium Society

International Betta Congress

Aquarium Club of Lancaster County

Northeast Philadelphia Aquarium Society

Greater Pittsburgh Aquarium Society, Inc.

Pittsburgh Marine Aquarium Society

Erie Aquarium Society

### Rhode Island

Tropical Fish Society of Rhode Island

### South Carolina

Myrtle Beach Aquarium Club

### Tennessee

Putnam County Aquarium Society

West Tennessee Marine & Reef Aquarium Club

### Texas

Federation of Texas Aquarium Societies

Capital Aquarium Society of Texas

Dallas/Ft. Worth Aquatic Plant Club

North Texas Water Garden Society

### Utah

Great Salt Lake Aquarium Society

Wasatch Marine Aquarium Society

### Vermont

Black River Aquarium Society

### Virginia

Potamac Valley Aquarium Society

### Washington

Bellingham Aquarium Society

Greater Seattle Aquarium Society

Kitsap Aquarium Society

Washington Koi and Water Garden Society

### Wisconsin

Milwaukee Aquarium Society

Green Bay Aquarium Society

Central Wisconsin Aquarium Society

<http://www.gpas.org/>

<http://www.bcasonline.com/>

<http://www.dcas.us>

<http://ibcbettas.com/>

<http://www.aclc.us/>

<http://www.phillyfishclub.com/>

<http://www.gpas.org>

<http://www.pmasi.org/frm/>

<http://groups.yahoo.com/group/ErieAquariumSociety/>

<http://www.tfsri.org/>

<http://www.facebook.com/pages/Myrtle-Beach-Aquarium-Club/402263799688>

<http://www.pcaquarium.org>

<http://www.wtmrac.com/>

<http://www.fotaswebsite.org/>

<http://www.petsforum.com/cas/>

<http://www.aquatic-plants.org/>

<http://www.ntwgs.org/>

<http://fancyguppy.50megs.com/custom2.html>

<http://www.utahreefs.com/>

<http://www.angelfire.com/vt/brasvt/>

<http://www.pvas.com/pvasindex.htm>

<http://www.facebook.com/pages/Bellingham-Aquarium-Society/112557868810416>

<http://www.gsas.org/>

<http://www.geocities.com/Petsburgh/5640/kastoc.htm>

<http://www.washingtonkoi.org/>

<http://fishclubs.com/WI/MAS/>

<http://www.gbasonline.org/gbashome.htm>

<http://www.cwas.org/>

## PUERTO RICO

Asoci. de Acuaristas de Aguadilla

Acuarista Metro Este

<http://coqui.metro.inter.edu/acuaristas/aaa.html>

<http://www.amepr.org/>

## BERMUDA

Bermuda Fry-Angle Aquarium Society

<http://www.fryangle.com/>

## BRAZIL

Aquaflux Aquarismo e Aquapaisagismo

Aqualinea

<http://www.aquaflux.com.br>

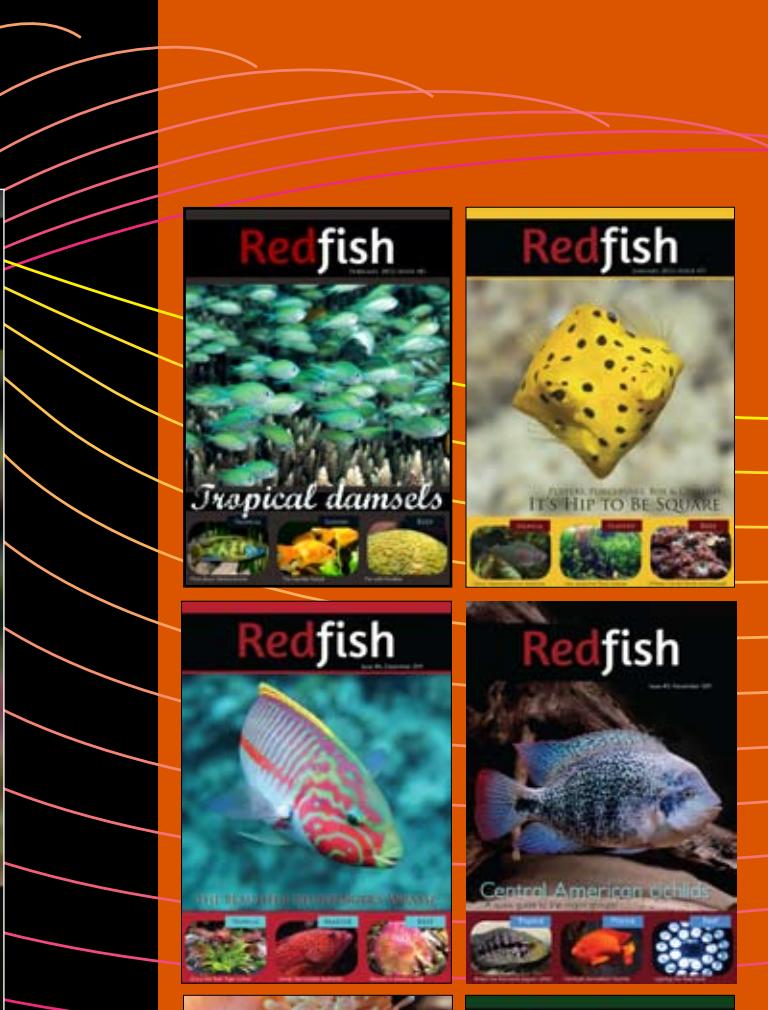
<http://aqualinea.com.br/blog/>



Photo by Hobvias Sudoneighm

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